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New records of scuttle flies (Diptera: Phoridae) from South Africa, with description of a new species and hitherto unknown males

by

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ABSTRACT

New data on distribution of scuttle flies in South Africa are provided and ten species are added to the South African fauna, which enlisted 70 phorid species before. *Phlebothrix judithmastersae* sp. n. is described from KwaZulu-Natal and Eastern Cape. Hitherto unknown males of *Aenigmatopoeus kohli* Schmitz, 1915, *Ae. orbicularis* Schmitz, 1914, *Borophaga* (*Latiborophaga*) *rufibasis* Beyer, 1959 and *Stichillus necopinatus* Beyer, 1960 are described.

INTRODUCTION

The Phoridae are probably the most biologically diverse family of Diptera, and of the Insecta as a whole, comprising thousands of species in about 250 genera. The larvae of a large number of scuttle fly species are parasitoids or specialist predators on various invertebrates, including earthworms, molluscs, arachnids, centipedes, millipedes, and many groups of insects, and therefore some may prove useful as biological agents for pests (e.g. Robinson & Brown 1993; Brown 2000; Morrison 2000). Some species are themselves pests, such as *Megaselia halterata*, *M. agarici* and *M. tamilnaduensis*, notorious spoilers of cultivated mushrooms (e.g. Moreton & John 1955; Johal & Dishey 1994; Lee *et al.* 2001). Phorid species are involved in cases of myasis in both man and his livestock (e.g. Rhodes-Jones 1957; Singh & Rana 1989), can represent a potential health hazard (Karunaweera *et al.* 2002) or be useful in forensic entomology (Greenberg & Wells 1998; Dewale *et al.* 2000; Centeno *et al.* 2002). Other species are important pollinators. The mature females of some phorids inhabit the fungus gardens of termites. Because of their diversity in most terrestrial habitats and the wide range of life styles, phorids are an excellent family for modelling biodiversity conservation efforts (Disney 1994). Scuttle-flies are becoming increasingly popular in genetic studies (e.g. Traut 1994; Shearman 2002).

These flies are exceptionally diverse in tropical fauna, and in the Afrotropical Region, in particular. Although Southern African scuttle flies have been studied since the beginning of the last century (Brues 1907, 1910, 1919, 1924; Trägårdh 1910; Schmitz 1927, 1950; Beyer 1959*a*, *b*, 1960, 1965*a*, *b*; Disney 1982, 1988; Disney & Kistner 1989, 1992, 1995, 1997; Compton & Disney 1991; Hibbs & Brown 1997), data on this fauna and species distribution are still scanty. There are 53 scuttle fly species cited in the Catalogue of the Diptera of the Afrotropical Region (Smith 1980) as occurring in South Africa, and 17 named species has been added to this list since then. Only scuttle-flies associated with termites have been covered more or less appropriately (Disney & Kistner *l.c.*), whereas other taxa, which constitute the majority of the phorid fauna, are virtually unstudied.

The present paper deals with new records of some phorid species and provides descriptions of hitherto unknown males of *Aenigmatopoeus kohli*, *Ae. orbicularis*, *Borophaga* (*L.*) *rufibasis*, and *Stichillus necopinatus*, as well as of a new species of the genus *Phlebothrix*. The bulk of material in collections represents the giant genus *Megaselia* Rondani, which includes about 1500 species worldwide. It is difficult to treat this genus taxonomically, since many species have been described from central Africa and type material needs re-examination. However, many new species and interesting finds are expected in South Africa in due course.

MATERIAL AND METHODS

Specimens were collected mainly by Malaise traps, yellow pan traps, pitfall traps and sweepnets. Scuttle flies were mounted on slides in Berlese Fluid as proposed by Disney (1983). This has proved the best technique, being especially useful for smaller representatives of the family. Some specimens were identified unmounted and left in alcohol or mounted on pins. To mount specimens on pins from alcohol, hexamethyldisilazane (HMDS) was used (Brown 1993). Specimens were placed in 100% ethanol for dehydration and cleaning, transferred into a vial with HMDS for one-half to one hour, and then put onto a glass plate for drying and setting.

The following abbreviations for bristles are used (Disney 1994): *sant* – supra-antennals, *ant* – antials, *al* – antero-laterals, *ml* – medio-laterals, *pl* – postero-laterals, *po* – pre-ocellars, *oc* – ocellars, *h* – humerals, *ppl* – propleurals, *npl* – notopleurals, *sa* – supra-alars, *pa* – post-alars, *psc* – pre-scutellars. The SPS vesicles are the internal subcuticular pit sensillae of the antennal postpedicel (Pfeil *et al.* 1994). The costal index and costal section ratios have been measured according to Disney (1994).

Material studied is stored in the following collections: Natal Museum, Pietermaritzburg, South Africa (NMSA); South African Museum, Cape Town, South Africa (SAMC); National Collection of Insects, Plant Protection Research Institute, Pretoria, South Africa (PPRI); Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS).

TAXONOMY

Aenigmatopoeus Schmitz, 1914

There are six known species in this afrotropical genus (Disney & Kistner 1997). However, five of them are known only from females; *Ae. cucullatus* being described on both sexes (Colyer 1958). I have males of several species on hand, but only males of *Ae. kohli* and *Ae. orbicularis* can be associated with confidence with their females, as they have been found together in Malaise trap samples when no other species was present. Females are wingless and could be carried to traps by the males. Regrettably, no males can be assigned undoubtedly to *Ae. cucullatus* and Colyer's (1958) description is used for comparison.

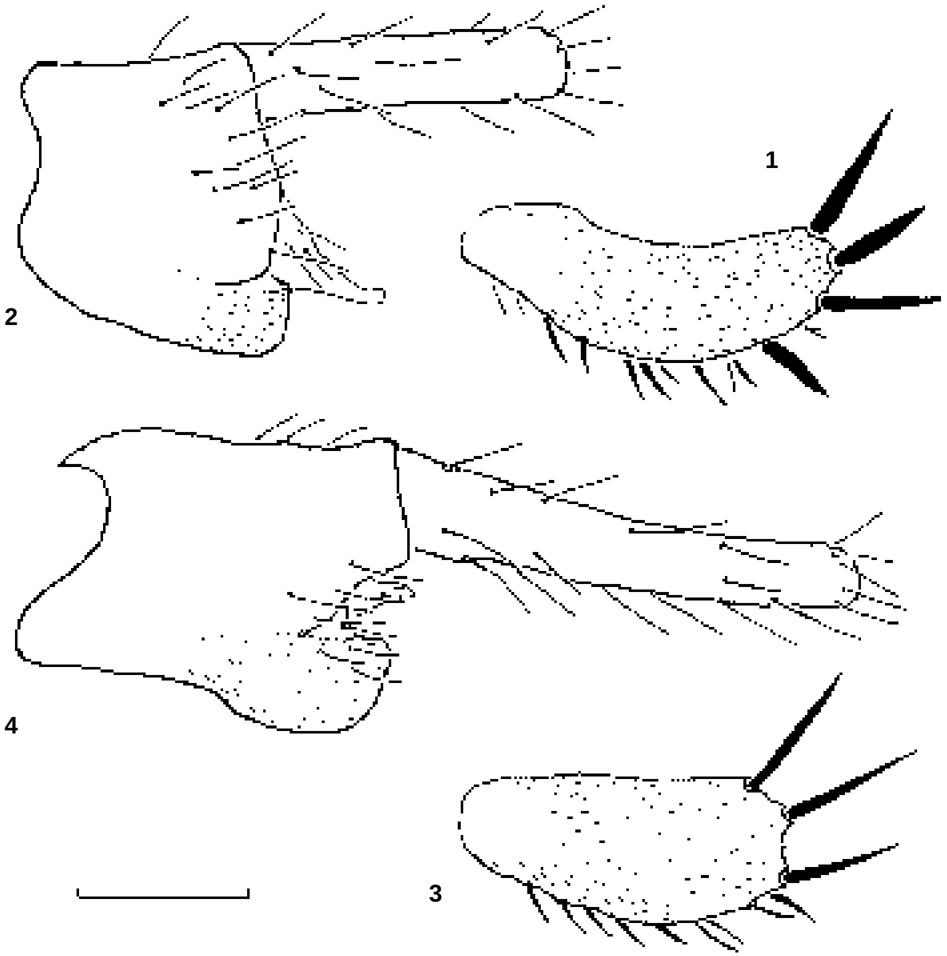
Flies of the genus *Aenigmatopoeus* are myrmecophilous and termitophilous, and an association with Dorylinae ants has been recorded by Disney (1994) for *Ae. kohli* and *Ae. orbicularis*.

Aenigmatopoeus kohli Schmitz, 1915

Figs 1, 2

Aenigmatopoeus kohli Schmitz, 1915: 487, 1951*a*: 141, fig. VII; Borgmeier 1963: 468; Disney & Kistner 1997: 3 (key). (Type locality: Congo)

Description: Male. Body generally dark brown or with weak reddish tint, palpi, pleura, legs and hypopygium greyish brown, basal half of hind femur and anal tube paler. Frons evenly convex and covered with hairs, with only one pair of short *sant* and very short *oc* that barely differ from adjacent hairs. Third antennal segment onion-shaped or almost semiglobular, arista almost apical. Palpus over 3 times as long as wide, with 3 apical and 1 ventromedial bristle, which is almost as strong as apical ones; additionally, palpus with numerous hairs or spinules ventrally or ventrolaterally and fine pubescence



Figs 1–4. Morphological details of *Aenigmatopoeus* males. 1, 2. *Ae. kohli* Schmitz. 1. Left palpus, dorsal view. 2. Epandrium, left side. 3, 4. *Ae. orbicularis* Schmitz. 3. Left palpus, dorsal view. 4. Epandrium, left side. Scale bar 0.1 mm.

dorsally (Fig. 1). Each labellum with 2 bristle-like hairs laterally and one noticeably longer apical hair. Each side of thorax with 2 *ppl*, 3 *npl*, 1 *sa*, 1 *pa*, 1 *psc*, all weak. Mesopleuron with hairs in its upper half and one long bristle in its posterior corner. Scutellum with four pairs of strong bristles. Wing length 1.4–1.66 mm. Costal index 0.49–0.53, costal ratios 0.8–0.92:1. Sc not discernible. R_1 not noticeably thickened. Rs without seta at base. Axillary ridge without bristles. All veins greyish brown, wing membrane almost not coloured or slightly greyish. Haltere brown. Ventral bristle on fore metatarsus inserted in distal half of segment. Mid tibia with two hair palisades and posterodorsal row of 5–6 differentiated subequal bristle-like hairs; additionally, one short and weak anterior bristle present in basal third. Hind tibia with three hair palisades, viz. straight dorsal one and two anterodorsal palisades fusing together in distal quarter or distal third, and posterodorsal row of 8–9 differentiated bristle-like hairs. Abdominal tergites with scattered short hairs, hairs on tergite 6 longer. Abdominal venter bare. Epandrium approximately as long as high (Fig. 2). Posterior margin of left side of epandrium not concave, its posteroventral corner forming narrow lobe; bristles confined to its posterodorsal quarter. Inner lobe of left side of epandrium well developed, with broad base and attenuated distal part, with three bristles, which are subequal to those on left side of epandrium. Bristles on right side of epandrium clearly as strong as those on anal tube. Anal tube 4 times as long as thick at its base.

Comparison: It differs from the only previously known male of *Ae. cucullatus* in having only one pair of *sant* (several in *Ae. cucullatus*), non-clavate and shorter palps, eight almost equally developed scutellar bristles (the anterior pair of scutellars is weak in *Ae. cucullatus*), and slightly longer first costal section (0.8–0.92:1 *vs*. 0.77:1 in *Ae. cucullatus*); in contrast to the former species, the left side of epandrium of *Ae. kohli* has relatively straight posterior margin and weakly developed lower lobe.

Material examined: SOUTH AFRICA: *Western Cape*: 2♂ 2♀ , 10 km SE Vanrhynsdorp, 3118DA, along river, 14.x.1977, Malaise trap, R.M. Miller; *KwaZulu-Natal*: 2♂, Himeville, 3–5.iii.2004, Malaise trap, V. Kolyada & M. Mostovski; 1♂, Southern Drakensberg, Sani Pass (29°37'S:29°23'E), 2–5.iii.2004, Malaise trap, V. Kolyada & M. Mostovski (NMSA).

Distribution: Zaire, Angola, South Africa. This is the first record of this species in South Africa.

Aenigmatopoeus orbicularis Schmitz, 1914

Figs 3, 4

Aenigmatopoeus orbicularis Schmitz, 1914: 536, 1951*a*: 141; Disney & Kistner 1997: 3 (key). (Type locality: Cameroon)

Description: Male. Body brown, palpi, pleura, legs and anal tube yellowish brown. Frons evenly convex and covered with hairs, with only one pair of short *sant* and *oc* that however differ well from adjacent hairs. Third antennal segment almost semiglobular, arista almost apical. Palpus clearly less than 3 times as long as wide, with 3 strong apical and 1 weak ventromedial bristle, which is almost 0.5 times as long as apical ones; additionally, palpus with numerous hairs or spinules ventrally or ventrolaterally and fine pubescence dorsally (Fig. 3). All bristle-like hairs on labella equally long. Each side of thorax with 2 *ppl*, 3 *npl*, 1 *sa*, 1 *pa*, 1 *psc*, all weak. Mesopleuron with hairs in its upper half and one long bristle in its posterior corner. Scutellum with three pairs of long and strong bristles. Wing length 1.70–1.74 mm. Costal index 0.51–0.53, costal ratios 0.68–0.79:1. Sc discernible at the very base only. R_1 intensely coloured and bordered with pigmented membrane in its distal two thirds so it looks thickened. Rs without seta at base. Axillary ridge without bristles. All veins brown and bordered with pigmented membrane, wing membrane brownish yellow, with subcostal cell being little darker. Haltere brown. Ventral bristle on fore metatarsus inserted at its mid-length. Mid tibia with two hair palisades and posterodorsal row of 6–7 differentiated bristle-like hairs, most apical of which clearly longer and stronger; no bristles in isolated bristles in basal half. Hind tibia with three hair palisades, viz. straight dorsal one and two anterodorsal palisades fusing together in distal third, and posterodorsal row of 6–10 bristles or differentiated bristle-like hairs. Abdominal tergites with scattered short hairs, hairs on tergite 6 longer, especially in its distal half. Abdominal venter bare. Epandrium clearly longer than high (Fig. 4). Posterior margin of left side of epandrium with deep incision, its posteroventral corner forming broad lobe; bristles restricted to its dorsal edge and posterior margin. Inner lobe of left side of epandrium developed as small beak-like process with 3 minute spinules. Bristles on right side of epandrium at most as strong as those on anal tube. Anal tube 4.5 times as long as thick at its base.

Comparison: The male of this species differs from both *Ae. cucullatus* and *Ae. kohli* in having much shorter palps with only three strong apical bristles, only three pairs of strong scutellars, distinctly concave posterior margin of the left side of the epandrium, and a different pattern of setation on it. Additionally, it differs from *Ae. cucullatus* in having only one pair of *sant*, and from *Ae. kohli* in the first costal section being somewhat shorter, noticeable pigmentation of the wing membrane, slightly elongated epandrium and anal tube, well developed lower lobe of the left side of the epandrium, shorter hairs on the right side of the epandrium, and in having very short beak-like inner lobe of the left side of the epandrium bearing only minute spinules.

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♂, Himeville, 3–5.iii.2004, Malaise trap, V. Kolyada & M. Mostovski; 1♂, Impendle, Nhlosane Farm (29°35'S:29°58'E), 1700–1900 m, 24.xi–8.xii.1993, pitfalls, J. Kotze; 1♂, Pietermaritzburg, Hilton (29º32'30.7"S:30º18'18.4"E), 1131 m, 27.ix–13.x.2003, Malaise trap, M. Mostovski; 2♂ 2♀ , Pietermaritzburg, Town Bush, v.1976, Malaise trap, R. Miller; 1♀ , Cumberland Nature Reserve (29º30.8'S:30º30.3'E), 11.iv–8.v.2004, Malaise trap in gorge near stream, M. Mostovski & C. Conway; 1♂, Ramsgate, Butterfly Sanctuary (30°53.3'S:30º20.4'E), 9.viii–2.ix.2004, Malaise trap near stream, M. Mostovski (NMSA).

Distribution: Cameroon, South Africa. This is the first record of this species in South Africa.

Remarks: The female collected in the Cumberland Nature Reserve is mature, and two large eggs (0.67 mm long) have been observed inside her abdomen.

Genus *Borophaga* Enderlein, 1924

Subgenus *Latiborophaga* Brown, 1992

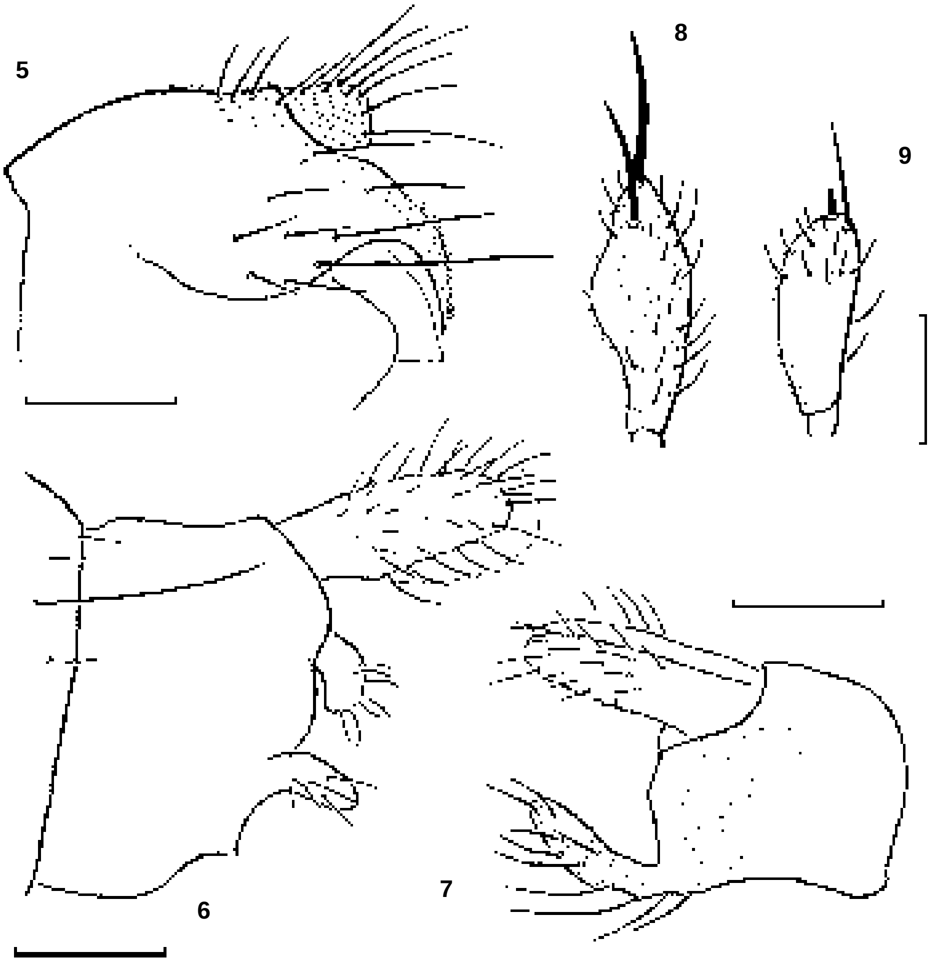
Brown (1992) erected the genus *Latiborophaga* for two neotropical and two afrotropical species originally described in the genus *Borophaga*. Disney (1994) proposed to treat *Latiborophaga* at the subgeneric rank. I tend to agree with the latter opinion at the present stage, for although these species do constitute a distinct group, characters used to separate *Latiborophaga* from *Borophaga* at the generic level are insufficient. The deflection of the wing vein RS does not occur in *rufibasis* males and cannot be used in the (sub)generic diagnosis.

Borophaga (*L.*) *rufibasis* Beyer, 1959

Fig. 5

Borophaga rufibasis Beyer, 1959*c*: 2, figs 1d, 2. (Type locality: Tanzania)
Latiborophaga rufibasis: Brown 1992: 40.

Description: Male. Frons dark brown, third antennal segment brown, palpi yellowish brown; thorax brown with reddish tint, pleura paler, fore and hind coxae yellow,



Figs 5–9. Poorly known and new species of South African scuttle flies. 5. *Borophaga rufibasis* Beyer, left side of epandrium. 6–8. *Phlebothrix judithmastersae* sp. n. 6, 7. Left and right sides of epandrium. 8. Female palpus. 9. *Phlebothrix cochlearipalpis*, female palpus. Scale bar 0.1 mm.

middle coxae brown, rest of legs mainly yellowish brown, fore legs a little paler, hind tibiae and tarsi darker, dorsal edges of hind femora brown; abdominal tergites brown to blackish brown, each tergite with whitish yellow stripe along rear margin; hypopydium brown. Frons with *sant*, *po*, *oc*, *al*, *ml*, *pl*, and numerous hairs; *ml* inserted halfway between *al* and *pl*, *po* form almost straight line with *ml* and as far apart as distance between *po* and *ml*. Ocellar triangle distinct, its posterior margin can be slightly elevated. Third antennal segment semiglobular, with subapical arista. Palpus with 1 ventral and 6 ventrolateral, subapical and apical bristles; subapical bristle longest and two apical bristles shortest. Propleuron with 2–5 bristles along its ventral margin and in posteroventral corner and 2 bristles at posterior margin. In addition to that, each side of thorax with 1 *h*, 3 *npl* (foremost *npl* about twice as long as rearmost *npl*), 1 *sa*, 1 *pa*, and 1 *psc*. Scutellum with posterior pair of strong bristles and anterior pair of weak setae, which almost as long as those on scutum. Mesopleuron in upper two thirds with 25–60 hairs, those along posterior margin longer. Wing length 1.9–2.5 mm. Costal index 0.50–0.54, costal ratios 0.8–0.98:1. Costa moderately thickened before and around R_1 tip. Sc complete, but weakly pigmented. Rs unforked, not deflected at mid-length, with 8–12 minute setae in basal half or basal two thirds. First thin vein gently arched at base, then straight; second thin vein almost straight; third thin vein slightly sinuous. Axillary ridge with 5–6 bristles. All veins brown, wing membrane yellowish or brownish. Haltere with deep black knob and brownish yellow stem. Fore tibia with no palisades and with one dorsal bristle just before its midlength; tarsomeres not modified, longer than wide, metatarsus with short but distinct ventral bristle in basal quarter. Mid tibia in basal third with long anterodorsal and posterodorsal bristles separated by complete dorsal palisade. Ventral spurs in fore and mid tibiae as long as metatarsi. Hind tibia with one anterodorsal bristle before its midlength and with two palisades, i.e. straight dorsal and deflected posterodorsal; apically with four or five complete setal combs. Ventral spur of hind tibia half long as hind metatarsus. Abdominal tergites with scattered short hairs, arranged mainly laterally and in posterior half of each tergite. Abdominal venter with setae arranged in rows, setae on fifth segment longest. Left side of epandrium with isolated short hairs just before anal tube and several longish hairs along posterior and ventral margins (Fig. 5). Right side of epandrium with several hairs around anal tube and along posterior and ventral margins; those on ventral margin clearly longer. Anal tube very short.

Material examined: Holotype and paratype: females labelled '[Tanzania] Msingi, 1–19.v.1952, D. O. Afrika Exp.' (SMNS). SOUTH AFRICA: *KwaZulu-Natal*: 1♂, Southern Drakensberg, Sani Pass, border police station, 4.iii.2004, yellow pan traps, V. Kolyada & M. Mostovski; 11♂, Impendle, Nhlosane Farm (29°35'S:29°58'E), 1700–1900 m, 24.xi–8.xii.1993, pitfalls, J. Kotze; 28♂ 2♀, same data except 22.xii.1993–5.i.1994; 6♂ 2♀, same data except 2–15.ii.1994; 9♂ 1♀, same data except 16.ii–1.iii.1994; 1♂ 1♀, Pietermaritzburg, Hilton (29°32'30.7"S: 30°18'18.4"E), 1131 m, 14–27.x.2003, Malaise trap, M. Mostovski (NMSA).

Distribution: Tanzania, South Africa. This is the first record of this species in South Africa.

Conicera Meigen, 1830

In Subsaharan Africa, two undescribed species of this genus were mentioned by Beyer (1965*b*) from Equatorial Africa. However, I am not aware of any published record of this genus from South Africa.

Conicera tibialis Schmitz, 1925

Conicera tibialis Schmitz, 1925: 119; Borgmeier 1969: 54; Disney 1983: 21, figs. 33, 38. (Type locality: Hungary)

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 4♂, Pietermaritzburg, Hilton (29º32'30.7"S:30º18'18.4"E), 1131 m, 14.x–12.xi.2003, Malaise trap, M. Mostovski; 1♂, same data except 24.xii.2003–14.i.2004 (NMSA).

Distribution: This species has been recorded worldwide, being possibly carried by man.

Remarks: This is the famous coffin-fly. The vernacular name derives from its frequent occurrence in buried corpses. Various authors (Schmitz 1928 1951*b*; Ardö 1953; Colyer 1954*a*) reported numerous larvae, pupae and adults of this species on bodies that had been buried for up to about four years. Evidence and laboratory experiments (Ardö 1953) suggest that a sequence of generations could be produced deep in the ground, without getting to the surface. It apperas that gravid females can make their way through the soil down to a depth of two metres (Smith 1986). Colyer (1954*b*, *c*) reports numerous swarming and copulating flies on the soil surface above a dead dog buried about one metre deep, a year and a half previously. Digging revealed adult flies present at all depths from the surface down to the corpse. A May generation had completely disappeared by mid-June, but flies were again seen swarming over the soil above the same place at the beginning of August, suggesting a second generation from the buried corpse. This activity at the surface occurred in sunshine. In dull weather the flies hid beneath soil clods.

Phlebothrix Borgmeier, 1969

Previously, this genus included only one species, *Ph. cochlearipalpis* from Madagascar and Tanzania. Now it is recorded in the northern part of KwaZulu-Natal, which is probably the southernmost boundary of it distribution, southward of which it is replaced by the new species described below.

Phlebothrix cochlearipalpis (Speiser, 1908)

Phora cochlearipalpis Speiser, 1908: 146. (Type locality: Madagascar)
Nossibea cochlearipalpis: Schmitz 1929: 101, fig. 21.
Phlebothrix cochlearipalpis: Borgmeier 1969: 54.

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♂ 3♀ , Hluhluwe Game Reserve, Camp, xii.1977, Malaise trap, J.G.H. Londt (NMSA).

Distribution: Madagascar, Tanzania, South Africa. This is the southernmost record and the first record of this species in South Africa.

Phlebothrix judithmastersae sp. n.

Figs 6–8

Etymology: Named after Dr Judith Masters, in whose garden the holotype and some paratypes were collected.

Description:

Male.

Frons, antennae, thorax, and abdomen dark brown, palpi brown to yellowish brown, all legs light brown or yellowish brown, hypopygium brown, with anal tube brownish yellow. Frons with 12 reclinate bristles: *sant*, *ant*, *al*, *ml*, *pl*, and *oc*; *ml* at the level of anterior ocellus, *ant* as wide apart as posterior ocelli and higher on frons than *al*. Patch of about 20–25 fine hairs in front of *sant*, about 20 somewhat longer and stronger hairs scattered in between frontal bristles, bunch of 6–9 longish hairs in the middle of ocellar triangle. Third antennal segment ovate, sometimes slightly pear-shaped or slightly elongated, with numerous small (0.01 mm) SPS vesicles; arista subapical. Palpus triangular clavate, with 2 short apical bristles, 1 longish lateroventral bristle, and 25–35 ventral hairs. Labella relatively small, with several curved ventrolateral and latero-apical bristle-like hairs and minute ventral spinules. Each side of thorax with 1 *h*, 1 *ppl*, 4 *npl*, 1 *sa*, 1 *pa*, 1 *psc*. Scutellum with 4 strong bristles and several small hairs. Mesopleuron with hairs arranged in two patches, along its rear margin and in its centre. Wing length 1.69–2.23 mm. Costal index 0.55–0.58, costal ratios 0.97–1.06:1 or 5.83–8.25:4.67–8:1, costal cilia 0.05–0.07 mm long. Vein Sc complete. R_1 with 7–17 hairs, RS with 8–16 hairs, anterior arm of RS fork sometimes faint or missing. Axillary ridge with 6–15 bristles. Haltere with yellowish stem and brown knob with greyish apex. Fore tibia with 5–8 short bristles in distal two thirds. Mid tibia with pair of short near dorsal bristles in basal quarter. Hind tibia usually with four anteroventral bristles, sometimes with five, rarely with three. Abdominal tergites with scattered hairs, which noticeably longer on tergite 6. Additionally, one long bristle on each side of tergite 6. Abdominal venter bare. Posterior margin of left side of epandrium clearly excavated (Fig. 6). Posterior margin of right side of epandrium irregularly convex, its lower corner extended into almost parallel-sided process (Fig. 7).

Female.

Frons, antennae, thorax, and abdominal tergites brown, abdominal venter brownish gray, palpi brownish yellow, all legs yellow, although femora brownish yellow. Frons approximately 1.4 times as wide at level of posterior ocelli as high. Frontal setation as in male, but *ant* wider apart than posterior ocelli and there are 13 hairs in front of *sant*; these hair almost as long as those in between frontal bristles. Ocellar triangle with only 4 hairs. Third antennal segment rounded triangular, with several small (0.01 mm) SPS vesicles; arista subapical. Palpus slender, with 1 longish apical bristles, 1 shorter preapical bristle, and approx. 25 ventral hairs; deep sensorial pit forming lateral swelling with wide orifice developed (Fig. 8). Labella as in male. Setation pattern of thorax, scutellum and mesopleuron as in male except for 2 *ppl*. Wing length 2.03 mm. Costal index 0.56, costal ratios 5.5:5.3:1, costal cilia 0.08–0.09 mm long. Vein Sc complete. R_1 with 9 hairs, RS forked, with 3 hairs. Axillary ridge with 5 bristles. Haltere with yellowish stem and brown knob with greyish apex. Setation pattern of legs as in male. Apex of hind tibia about 3.5 times as wide as its base. Abdominal tergites with short scattered hairs, which noticeably longer on tergite 6. Additionally, two long bristles on each side of tergite 6. Tergite 7 with longish hairs along its rear margin. Abdominal pleura 1–6 with longish hairs. Abdominal venter bare on segments 1 and 2, with median patch of hairs on segment 3, with normally developed setation on segments 4–6, and with hairs along rear margin of segment 7. In addition to that, a median pair of long hairs developed on each of segments 4–6.

Comparison: *Ph. judithmastersae* males differ from the type species of the genus in the posterior margin of the left side of the epandrium being distinctly excavated, posterior margin of the right side of the epandrium being not evenly convex, and in having its lower corner extended into almost parallel-sided, not clavate process, as well as in having more hairs on frons. *Ph. judithmastersae* females differ from the other species in having higher frons (approx. 1.4 times as wide as high against 1.6–1.9 times in *Ph. cochlearipalpis*), palpus bearing more distinct swelling that embraces the sensorial pit and having one bristle in the preapical position (the swelling is barely distinct in *Ph. cochlearipalpis* although the sensorial pit is well developed, both bristles are apical (Fig. 9)) and apically widened hind tibia (with its apex being approximately 3.5 times as wide as its base against 2.4–2.8 times in *Ph. cochlearipalpis*).

Material examined: holotype ♂, SOUTH AFRICA: *KwaZulu-Natal*: Pietermaritzburg, Hilton (29º32'30.7"S:30º18'18.4"E), 1131 m, 13–23.xi.2003, Malaise trap, M. Mostovski, paratypes: 2♂, same data as holotype except 28.x–12.xi.2003; 1♂, same data except 15–26.i.2004; 2♂, Pietermaritzburg, Hilton, uMngeni Municipality landfill site, 21–26.ix.2004, Malaise trap, M. Mostovski; 1♂, Queen Elizabeth Park Res. (29º34.157'S:30º19.299'E), 1–5.xii.2003, Malaise trap, forest patch, J.G.H. Londt & M. Mostovski; 1♂, Pietermaritzburg, Town Bush, iv.1977, Malaise trap, R. Miller; 1♂, Ramsgate, Butterfly Sanctuary (30º53.3'S:30º20.4'E), 10.vii–8.viii.2004, Malaise trap near stream, M. Mostovski; 1♂ 1♀, same data except 9.viii–2.ix.2004; *Eastern Cape*: 2♂, Port Elizabeth, Cape Recife Area, 3425BA, 22–27.xii.1985, J.G.H. Londt (all paratypes in NMSA except one male in the Zoological Museum of Cambridge University, UK, and one male in the Los Angeles County Museum, USA).

Distribution: South Africa: Southern KwaZulu-Natal, Eastern Cape.

Plastophorides Beyer, 1959

Currently, this genus includes four species, with only one known in the Afrotropical Region (Almond 2002).

Plastophorides aculeipes (Collin, 1912)

Aphiochaeta aculeipes Collin, 1912: 108, pl. 5, fig. 3. (Type locality: Seychelles)
Plastophorides aculeipes: Brues 1915: 137, Almond 2002: 148, figs 10, 11.

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 2♂, Pietermaritzburg, Hilton (29º32'30.7"S:30º18'18.4"E), 1131 m, 27.ix–13.x.2003, Malaise trap, M. Mostovski; 2♀, same data except 24.xii.2003–26.i.2004; 3♂, Ramsgate, Butterfly Sanctuary (30º53.3'S:30º20.4'E), 28.iv–5.vi.2004, Malaise trap, near stream, M. Mostovski; 3♂ 1♀, same data except 6.vi–9.vii.2004; 1♂, same data except 10.vii–8.viii.2004 (NMSA).

Distribution: Congo, Angola, Seychelles, Zimbabwe, South Africa. This is the first record of this species in South Africa.

Puliciphora Dahl, 1897

More than 70 species are known in this cosmopolitan genus. However, very few records were from South Africa. *P. jeanssoni* was described from Natal in a separate genus *Cryptopteromyia* (Trägårdh 1910), which was soon afterwards synonymised by Brues (1915) with *Puliciphora*. *P. stuckenbergi* was described from a unique specimen from around Stellenbosch (Disney 1988), and *P. rufipes* and *P. borinquenensis* were reported from Western Cape and Natal respectively (Beyer 1960; Disney 1988). Beside the species listed below, I have males of several other species, which cannot be identified confidently without association with their females.

Puliciphora rufipes Silva Figueroa, 1916

Puliciphora rufipes Silva Figueroa, 1916: 17; Disney 1988: 279, figs 17, 18. (Type locality: Chile)

Material examined: SOUTH AFRICA: *Western Cape*: 15♀, Klapmuts, Butterfly World, 8.ix.1997, associated with dead *Papilio dardanus* larvae, E.V.D. Westhuizen (SAMC); *KwaZulu-Natal*: 2♂ 1♀, Giant's Castle Game Reserve (29º16.291'S:29º31.208'E), 1676 m, 27.x.2003, Malaise trap, *Leucosidea* & long grass, J.G.H. Londt; 8♂, Himeville, 3–5.iii.2004, Malaise trap, V. Kolyada & M. Mostovski; 4♂, Merrivale, Stuckenberg House (29º30'S:30º15'E), 1021 m, 29.x.2003, on window, B. Stuckenberg; 1♂, Pietermaritzburg, Hilton (29º32'30.7"S:30º18'18.4"E), 1131 m, 27.ix–13.x.2003, Malaise trap, M. Mostovski; 3♀, same data except 28.x–12.xi.2003; 5♂ 1♀, same data except 24.xii.2003–14.i.2004 (NMSA).

Distribution: Chile, Argentina, South Africa. This species was found for the first time in South Africa in Tulbagh, Western Cape (Disney 1988). This is the second record of *P. rufipes* in South Africa, but it is recorded for the first time inside an occupied house.

Remarks: This species has been recorded on pig carcasses in Argentina (Centeno *et al.* 2002), which makes it important in forensic investigations.

Puliciphora semicimex (Schmitz, 1951)

Coridophora semicimex Schmitz, 1951*a*: 158, fig. XV. (Type locality: Kenya)
Puliciphora semicimex: Disney 2002: 79, figs 1, 8.

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 2♀ Impendle, Nhlosane Farm (29º35'S:29º58'E), 1700–1900 m, xi.1993, pitfalls, J. Kotze (NMSA).

Distribution: Nigeria, Cameroon, Congo, Kenya, South Africa. This is the first record of *P. semicimex* in South Africa.

Remarks. This species has proved to be quite variable although distinctive member of the genus (Disney 2002). It is characterised by unusually wide abdominal tergites and the highly reduced anterior flap of abdominal tergite 5. Two females on hand demonstrate the extreme state of the anterior flap, which is barely visible; however, other characters agree well with diagnostic features of *P. semicimex*.

Ritchiephora Disney, 1997

Ritchiephora diplopodae Disney, 1997
Ritchiephora diplopodae Disney & Ritchie, 1997: 153, figs 1–5. (Type locality: Kenya)

Material examined: TANZANIA: 1♀, Mkomazi Game Reserve, forest above Ibaya, (3º58'S:37º47'E), 7.v.1996, ex Winkler bag, leaf litter from montane forest, H.G.

Robertson (SAMC); SOUTH AFRICA: *KwaZulu-Natal*: 8♂ 5♀, Himeville, 3–5.iii.2004, Malaise trap, V. Kolyada & M. Mostovski; 21♀, Impendle, Nhlosane Farm (29°35'S:29°58'E), 1700–1900 m, 22.xii.1993–5.i.1994, pitfalls, J. Kotze; 10♀, same data except 2–15.ii.1994; 1♀, same data except 16.ii–1.iii.1994; 3♂, Pietermaritzburg, Hilton (29°32'30.7"S:30°18'18.4"E), 1131 m, 27.ix–13.x.2003, Malaise trap, M. Mostovski; 4♂ 1♀, same data except 28.x–12.xi.2003; 1♂, same data except 24.xii.2003–14.i.2004; 1♀, same data except 15–26.i.2004; 1♂, Pietermaritzburg, Hilton, Winterskloof (29°35.27'S:30°17.91'E), 20–25.xii.2003, Malaise trap, C. Conway; 2♀, Queen Elizabeth Park Res. (29°34.157'S:30°19.299'E), 1–5.xii.2003, Malaise trap, forest patch, J.G.H. Londt & M. Mostovski; 1♂, Cumberland Nature Reserve (29°30.8'S:30°30.3'E), 11.iv–8.v.2004, Malaise trap in gorge near stream, M. Mostovski & C. Conway; 2♂ 1♀, Durban Metro, Kloof, 6–15.xii.2003, Malaise trap, long grass under tree near stream, D. Barraclough; 15♂, Ramsgate, Butterfly Sanctuary (30°53.3'S:30°20.4'E), 26–28.iii.2004, yellow pan traps, V. Kolyada & M. Mostovski; 25♂ 5♀, same data except 6.vi–9.vii.2004, Malaise trap near stream, M. Mostovski; 48♂ 5♀, same data except 10.vii–8.viii.2004; 38♂ 10♀, same data except 9.viii–2.ix.2004 (NMSA).

Distribution: Kenya, Tanzania, South Africa. This is the first record of this species in Tanzania and South Africa.

Remarks: This species was described in a genus of its own from a series of males and females reared from an odontopygid millipede in Kenya (Disney & Ritchie 1997). Odontopygid millipedes are diverse and wide-spread in South Africa as well (M. Hamer *pers. comm.*). This species is quite variable in size.

Stichillus Enderlein, 1924

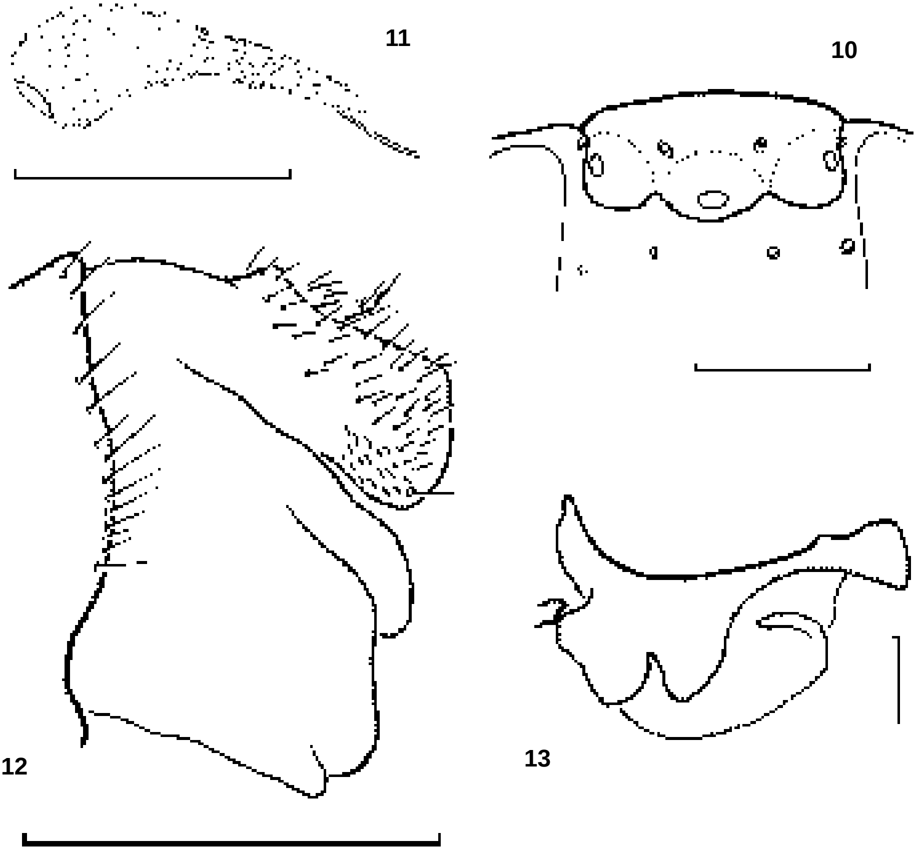
This cosmopolitan genus comprises about 30 species, although only one species has been recorded in the Afrotropical Region.

Stichillus necopinatus Beyer, 1960

Figs 10–13

Stichillus necopinatus Beyer, 1960: 391, fig. 5. (Type locality: South Africa)

Description: Male. Frons, thorax and abdomen dark brown to black with very weak metallic shine, notopleura slightly paler and postalar tubercles yellow, antennae light reddish brown, pedicel yellow to reddish brown, palpi, fore and middle legs brownish yellow, middle legs slightly darker, hind femur brown with unclear yellowish brown stripe extending from base to apex, inner face of hind femur yellowish brown, hind tibia dark brown with weak metallic shine and anterodorsal brown stripe, hind tarsi brown. Frons with *sant*, *al*, *ml*, *pl*, *po*, and *oc* in addition to numerous hairs; *pl* slightly weaker than other bristles and only outcurved, other bristles reclinate; *po* at least as far apart as *oc*; *ml* halfway between *al* and *pl* (Fig. 10). Third antennal segment (Fig. 11) densely pilose, as long as greatest diametre of eye, but clearly longer than frons width, drawn into long tapered process bearing dorsal arista, which is clearly shorter than segment itself. Palpus with 8 bristles mostly along its outer margin, preapical bristles the longest. Propleuron with 2 bristles along ventral margin and 2 bristles in posterodorsal corner.



Figs 10–13. *Stichillus necopinatus* Beyer, male. 10. Upper part of frons, only bristle sockets shown. 11. Right antenna. 12. Left side of hypopygium. 13. Left side of aedeagus. Scale bars 0.5 mm in Figs 10–12 and 0.1 mm in Fig. 13.

Additionally, each side of thorax with 1 strong and 4 weaker *npl*, 1 *sa*, 1 *pa*, 1 *psc*, and 4–6 long setae between *psc*. Scutellum with anterior pair of short setae and posterior pair of long and robust bristles. Wing length 3.3 mm. Costal index 0.49, costal ratios 0.96:1. Humeral vein and base of subcostal vein hardly discernible. Tip of R_1 thin and slightly desclerotised, with faint pigmentation around it. Rs with 19–22 hairs. Axillary ridge with seven bristles. Veins brown, wing membrane slightly brownish. Haltere with black knob and yellow stem. Front metatarsus slightly longer than second and third tarsomeres combined, second tarsomere a little longer than wide, tarsomeres 3–5 as long as wide, slightly widening toward tarsal apex, so apical tarsomer is widest. Mid tibia with two bristles in the end of basal third and dorsal hair palisade, which is deflected between bristles. Hind tibia with bristle in second quarter and three hair palisades, the most dorsal and anterior palisades straight and complete and meeting each other only at apex, intermediate palisade short, only a little longer than half length of tibia and fusing with anterior palisade soon below anterior bristle. Abdominal tergites with fine scattered hairs confined mainly to lateral parts and rear margins of tergites, abdominal venter with median fascicles of longish hairs on segments 5 and 6. First tergite golden tomentose dorsally, second tergite longer than tergites 3 and 4 combined but shorter than tergites 3–5 combined. Hypopygium (Fig. 12) mainly brown and shining. Each side of epandrium with numerous hairs along posterior margin and a patch of short spinules in posteroventral corner. Hypandrium yellowish brown or even yellow basally, with beige overhanging membranous lobes; lateral parts of hypandrium coarsely wrinkled. Ventral plate of aedeagus dark brown, dorsal plate brown basally and dorsally and yellowish brown or yellow laterally and apically; aedeagus without ornamentation, its dorsal side smooth, with only a small tubercle in distal quarter (Fig. 13). Anal tube brown, very short.

Material examined: Holotype: ♀ labelled ‘Indumeni Forest, Cathedral Peak area, Natal, Drakensberg, 23 Mar. 1955, B. Stuckenberg’ (NMSA). Additional material: SOUTH AFRICA: *Western Cape*: 4♂, Cape Town, Constantiaberg, above Donkerboskloof, 460 m, 7–21.iv.1995, Malaise trap, fynbos dominated by *Protea coronata*, S. van Noort; 1♂, same data except 21.iv–10.v.1995 (SAMC); *KwaZulu-Natal*: 2♂ 2♀, Impendle, Nhlosane Farm (29°35'S:29°58'E), 1700–1900 m, 16.ii–1.iii.1994, pitfalls, J. Kotze (NMSA).

Distribution: South Africa.

Remarks: Males and females of this species have been associated on the basis of occurrence in the same sample from Impendle.

Veranophora Disney, 2003

Veranophora medleri (Disney, 1981)

Auxanommatidia medleri Disney, 1981: 323, figs 1–7. (Type locality: Nigeria)
Veranophora medleri: Disney 2003: 173, figs 2–4.

Material examined: SOUTH AFRICA: *KwaZulu-Natal*: 1♀, 6 miles S of Pongola, 6.vi.1967, ‘Govn. Ent.’ (PPRI); 1♂, Ramsgate, Butterfly Sanctuary (30°53.3'S:30°20.4'E), 6.vi–9.vii.2004, Malaise trap, near stream, M. Mostovski (NMSA).

Distribution: This species had been originally described from Nigeria and Senegal and subsequently found in Yemen and Zimbabwe (Disney 2003). This is the first record of this species in South Africa.

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